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***D. Corrigan, T.G. MacHattie, and J. Chakungal***

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# The nature of the Wathaman Batholith and its relationship to the Archean Peter Lake Domain along the Reindeer Lake transect, Saskatchewan

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**Abstract:** The Wathaman Batholith in Saskatchewan is a stitching pluton emplaced at the boundary between accreted volcano-sedimentary rocks of the La Ronge Domain and the Archean Hearne Province margin. Along the northern shore of Reindeer Lake, megacrystic granitoid rocks of the Wathaman suite intrude and host xenoliths of Archean gneiss of the Peter Lake Domain. The Swan River complex, which intrudes Archean gneiss of Peter Lake Domain, contains mafic-ultramafic sills including layered olivine gabbro and diorite. It locally mingles with megacrystic monzodiorite of the Wathaman Batholith, suggesting a co-genetic relationship. Along its southern margin, the batholith intrudes metasedimentary rocks of the Park Island assemblage, interpreted as the remnant of a foreland basin. The Swan River complex, as well as voluminous granitic to granodioritic plutons occurring in the La Ronge Domain, greatly increase the amount and compositional diversity of plutonic rocks believed to form part of the Wathaman suite.

**Résumé :** Le Batholite de Wathaman (Saskatchewan) est un pluton de suture qui a été mis en place à la limite entre les roches volcano-sédimentaires accrétées du Domaine de La Ronge et la marge archéenne de la Province de Hearne. Le long du littoral nord du lac Reindeer, des granitoïdes mégacristallins de la suite de Wathaman recouper et contiennent des xénolites de gneiss archéen du Domaine de Peter Lake. Le complexe de Swan River, qui recoupe le gneiss archéen du Domaine de Peter Lake, contient des filons-couches mafiques-ultramafiques, y compris de la diorite et du gabbro à olivine stratiformes. Par endroits, il est mélangé à de la monzodiorite mégacristallin du Batholite de Wathaman, ce qui suggère une relation cogénétique. Le long de sa marge méridionale, le batholite pénètre des roches métasédimentaires de l'assemblage de Park Island, qui sont interprétées comme étant des vestiges d'un bassin d'avant pays. Le complexe de Swan River, aussi bien que les plutons granitiques à granodioritiques volumineux du Domaine de La Ronge, ont grandement augmenté la quantité et la diversité des compositions des roches plutoniques que l'on croit appartenir à la suite de Wathaman.

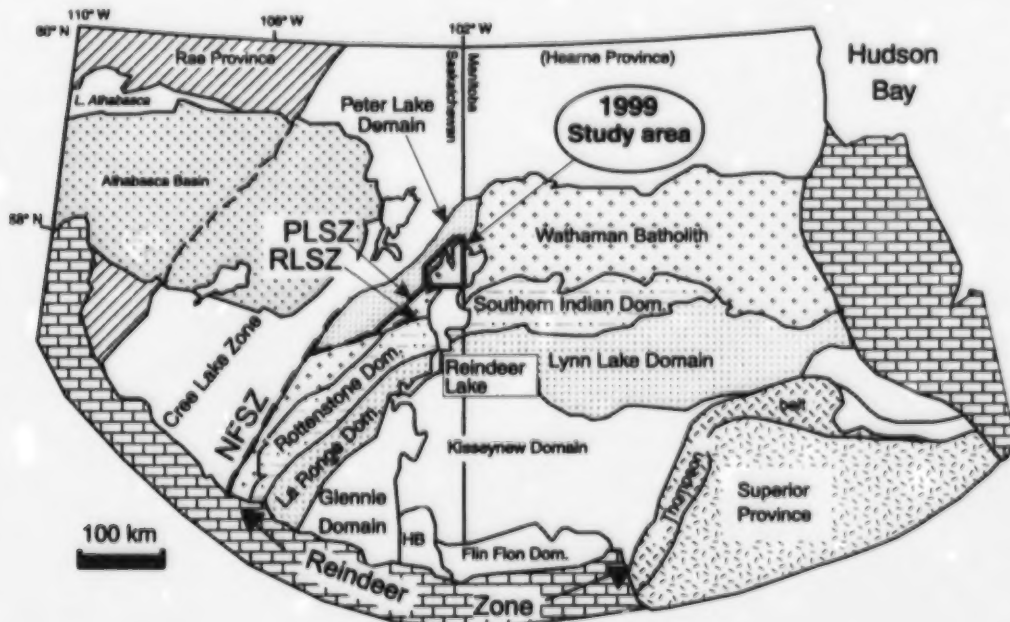
## INTRODUCTION

In 1997, the Geological Survey of Canada and Saskatchewan Energy and Mines joined in a collaborative effort aimed at enhancing our understanding of the 'La Ronge-Lynn Lake Bridge' as well as the lithotectonic framework of the north-western Reindeer Zone in the Paleoproterozoic Trans-Hudson Orogen. During the first two summers, regional mapping at 1:50 000 scale (Corrigan et al., 1998a, b, 1999), integrated with local detailed mapping of the Central Metavolcanic Belt at 1:20 000 scale (Corrigan et al., 1997; Harper, 1997, 1998; Maxeiner 1997, 1998) was completed in a 3000 km<sup>2</sup> corridor extending from the north flanks of Glennie and Kisseynew domains, to the central part of the Wathaman Batholith (Fig. 1). This past summer was the third and final field season for the GSC involvement in the Reindeer Lake Project. Part of the field season was spent re-examining outcrops and collecting more data and samples on newly recognized supracrustal rocks in the Rottenstone Domain and its extension in Manitoba in the Paskwachi Bay area, now interpreted in part as the northern extension of the La Ronge Domain (Corrigan et al., 1999). Results from this mapping initiative will not be described here. The second part of the field season was spent in the northern region of Reindeer Lake where we completed the transect from the interior of the Wathaman Batholith to the Archean Peter Lake Domain, covering NTS area 64 E/9 in its entirety and parts of 64 E/10 and 64 E/16. The most recent regional scale mapping in this area was by Shklanka (1962) and Stauffer et al. (1981). Results of our fieldwork are described below.

## REGIONAL GEOLOGY

The Trans-Hudson Orogen in Saskatchewan and Manitoba consists of a collage of juvenile arcs, oceanic crust, and sedimentary basins (Reindeer Zone) that were deposited onto or accreted to the margins of the Archean Hearne and Superior provinces between ca. 1.90 and 1.83 Ga before being reworked, together with the craton margins, during ca. 1.83–1.79 Ga collision (Lewry et al., 1981; Bickford et al., 1990; Lucas et al., 1996). The northwestern flank of the orogen (northwestern Reindeer Zone) is well exposed along the Reindeer Lake transect, which comprises the Kisseynew, La Ronge, Rottenstone, and Peter Lake (reworked Archean) lithotectonic domains (see Corrigan et al., 1999 for a review and update on domain definitions). Early models proposed by Lewry et al. (1981) and Bickford et al. (1990) suggested that the La Ronge island arc (represented by the Central Metavolcanic Belt component of the La Ronge Domain and its associated sediments) initially formed as a result of southeasterly subduction of oceanic lithosphere during the interval 1890–1878 Ma, before being accreted on the Archean Hearne craton sometime during the interval 1875–1865 Ma. Evolution of the Wathaman Batholith is thought to have initiated at ca. 1865 Ma as a result of subduction flip to the northwest, beneath the previously accreted La Ronge arc and Hearne margin (e.g. Meyer et al., 1992).

During the 1998 field season, extensive tracts of metavolcanic, volcanoclastic, and epiclastic rocks were identified in the Rottenstone Domain and interpreted as northern extensions of the Central Metavolcanic Belt of the La Ronge



**Figure 1.** Lithotectonic map of the Trans-Hudson Orogen in Saskatchewan and Manitoba (modified after Lewry et al., 1990). NFSZ = Needle Falls shear zone; PLSZ = Parker Lake shear zone; RLSZ = Reilly Lake shear zone; HB = Hanson Lake Block; Dom. = Domain

Domain (Corrigan et al., 1998a, 1999). A distinct metasedimentary package (Park Island assemblage) was also identified in this area (Corrigan et al., 1998a, 1999). It consists of magnetite-bearing fluvial to marine sediments including polymictic conglomerate with clasts of banded iron-formation, arkose, and calcareous psammite. This package unconformably sits on previously folded volcanic and sedimentary rocks of the La Ronge Domain and is intruded to the north by the ca. 1865–1850 Ma Wathaman Batholith, constraining its deposition between ca. 1878 Ma, the youngest known volcanic from the Central Metavolcanic Belt and ca. 1865 Ma, the oldest known age for Wathaman Batholith magmatism (Ray and Wanless, 1980). We have interpreted the Park Island assemblage as the remnant of a foreland basin that formed as a consequence of tectonic loading of the La Ronge arc onto the Hearne continental margin (Corrigan et al., 1999). Yeo (1998) suggested that sediments interpreted as remnants of a foreland basin may also be present in the Wollaston fold belt in the Janice Lake area, in agreement with our model. Essentially, these observations correlate with the tectonic evolution postulated by Lewry et al. (1981), with the added precision that the Rottenstone "tonalites and migmatites" consist of a mixture of the Crowe Island complex, previously unrecognized fragments of the Central Metavolcanic Belt, and the Park Island assemblage, which we now all include in the La Ronge Domain (Corrigan et al., 1999).

In the Reindeer Lake area, the Wathaman Batholith had been interpreted to form a voluminous, continental-arc plutonic suite dominated by K-feldspar megacrystic to coarse-grained monzonite, quartz-monzonite, granodiorite, and granite, with minor diorite and aplite (Stauffer et al., 1981; Fumerton et al., 1984; Meyer et al., 1992). Earlier workers have emphasized the facts that 1) it is more potassic than Phanerozoic analogues, 2) it does not contain discrete intrusive phases but rather phases that grade into one another, and 3) that it is separated from gneiss of the Rottenstone and Peter Lake domains by the Reilly Lake shear zone and Parker Lake shear zone, respectively. During the latter part of the 1998 field season, and during most of this past season, we remapped the batholith at 1:50 000 scale and re-examined its northern and southern boundaries. Field observations and preliminary U-Pb zircon ages (D. Corrigan, R. Maxeiner, and S.B. Lucas, unpub. data, 1999) suggest that magmatism associated with the Wathaman Batholith is not restricted *per se* to the area outlined in earlier maps and reports (e.g. Stauffer et al., 1980, 1981; Johnston and Thomas, 1984). It comprises a number of large plutons ranging in composition from pyroxenite to biotite granite, but formed predominantly quartz diorite and diorite, that extend to the southern edge of the La Ronge Domain (Corrigan et al., 1998a, 1999). These observations imply that 1) added together, the Wathaman Batholith and its related intrusions in Peter Lake Domain and La Ronge Domain may not be unusually potassic; 2) it does, in fact, contain discrete intrusive phases; and 3) the Reilly Lake and Parker Lake shear zones do not bound the batholith but merely rework its intrusive margins.

## PETER LAKE DOMAIN

Because the main objective of mapping this past summer was to establish the nature and timing of the contact relationship between the Archean craton margin and the Wathaman Batholith, mapping in the Peter Lake Domain was mainly concentrated in an 8–10 km strip along its most southeasterly margin. This part of Peter Lake Domain corresponds to the Lueaza River granitoid rocks (i.e. map unit 4, Stauffer et al., 1981), which had been described in their report as comprising highly deformed and metamorphosed biotite-thornblende-bearing rocks interpreted as either high-level intrusive rocks, anatectite, or metasomatized intrusive rocks, including migmatite of possible sedimentary origin. This summer's work, which focused on well exposed shoreline and island outcrops on Reindeer Lake (Fig. 2), suggests that the Lueaza River granitoid rocks are indeed predominantly composed of migmatite of both plutonic and sedimentary origin, but also contains abundant nonmigmatitic, strongly foliated and recrystallized granitoid rocks, as well as minor supracrustal screens. All of these are intruded by highly deformed and recrystallized amphibolite dykes, younger plagioclase-phryic mafic dykes and granitoid plutons related to the Wathaman suite (see below).

The most northwesterly portion of the Lueaza River granitoid rocks (Fig. 2) consists of metatexite and diatexite derived predominantly from igneous protoliths of dioritic to granitic composition (Fig. 3), as well as minor migmatite of clastic sedimentary origin (i.e. "migmatitic ortho- and paragneiss" of Fig. 2). Stromatic granitic leucosomes are ubiquitous and generally transposed parallel to the main regional foliation trend.

A few outcrops consisting of heterogeneous amphibolite with calc-silicate alteration bands and pods are locally found (Fig. 4) intercalated with migmatite and granitoid rocks of the Lueaza River granitoid unit. They are discontinuous along strike and rarely exceed a few tens of metres in thickness. Because of their very fine-grained and compositionally heterogeneous nature and association with thin calc-silicate bands, they more likely represent deformed and metamorphosed mafic flows as opposed to sheared mafic intrusions. Three such occurrences are large enough to be identified on the map ("Metavolcanic rocks" of Fig. 2). Their occurrence on the north shore of a small unnamed bay north of Wiley Bay has been described by MacDougall (1988). Three other occurrences have been found this past summer on the northwestern shore of Feavivour Peninsula and on the west shore of McLean Bay.

Nonmigmatitic, foliated granitoid rocks form the most abundant component of the Lueaza River granitoid unit and are found in two elongate belts flanking the migmatitic para- and orthogneiss units to the northwest and southeast. The northwestern belt is approximately 1 km wide and consists of mixed granodiorite and granite with numerous, transposed diorite enclaves. The southwestern belt includes Crane Island and consists predominantly of a white to light tan, sugary-textured leucogranite containing up to 10% biotite. Light grey biotite granodiorite is also found, typically associated



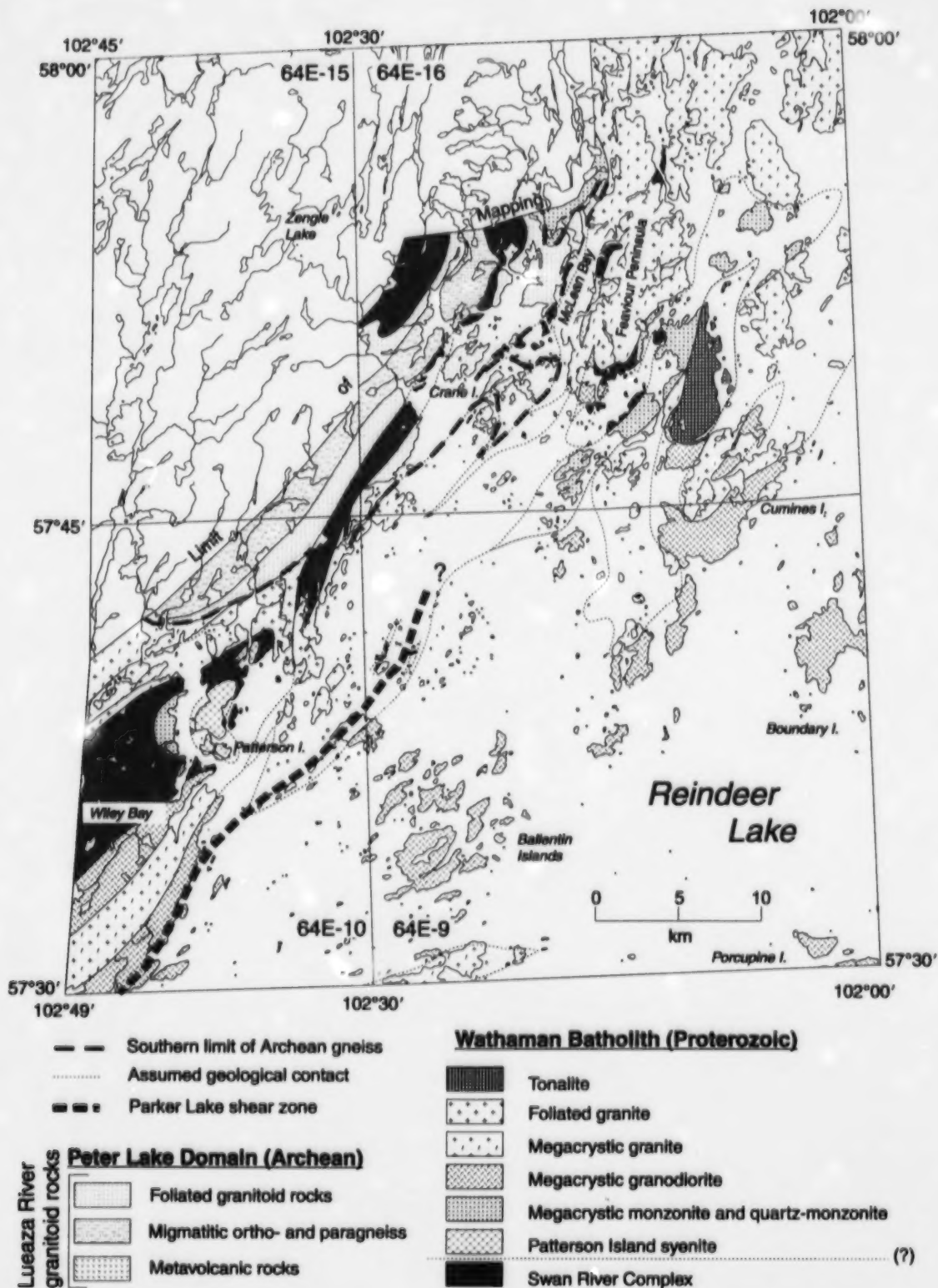
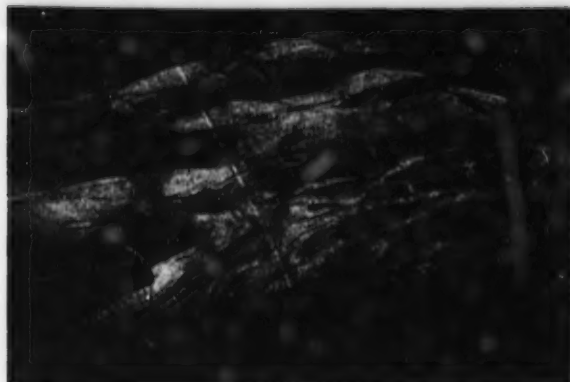


Figure 2. Geological map of the northern shore and islands of Reindeer Lake.



**Figure 3.** Outcrop photograph of Lueaza River granitoid unit showing migmatitic granodiorite orthogneiss (front of picture) intruded by boudined diorite (dark colour) and fine-grained white granite; geological hammer for scale.



**Figure 4.** Outcrop photograph of mafic metavolcanic rock with calc-silicate alteration (light-coloured patches); small bay on west shore of Feavivour Peninsula; Hammer for scale.

with the leucogranite. A less abundant rock type consists of pink biotite granite, and is more commonly found as narrow intrusions or dykes intruding the white granite and granodiorite. A distinctive phase of the intrusive complex consists of salmon pink quartz syenite and syenite with up to 8% biotite as the main mafic phase. Allanite is an important accessory in the syenite, locally forming up to 2% of the mineral assemblage. Two granitoid samples on the shore of Reindeer Lake southwest of Crane Island, yielded U-Pb zircon ages of  $2582 \pm 19$  Ma and  $2556 \pm 22$  Ma (Bickford et al., 1986).

## WATHAMAN BATHOLITH

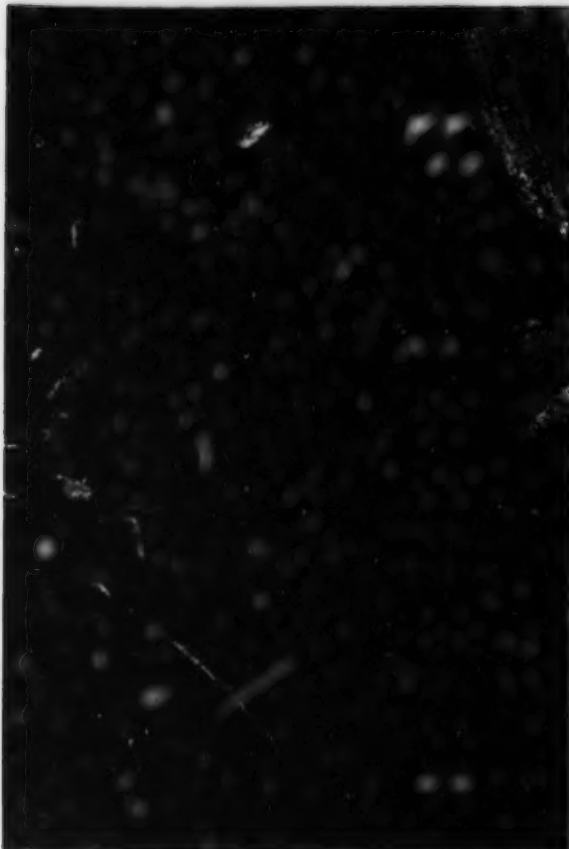
Investigations of the northern margin of the Wathaman Batholith along the southeastern margin of Peter Lake Domain has yielded substantial evidence suggesting that the

batholith intrudes the Archean craton margin. This includes megacrystic granitoid dykes cutting gneiss of the Lueaza River granitoid unit, and the presence of a few enclaves of Lueaza River granitoid in the Wathaman Batholith. Furthermore, we have found evidence (presented below) suggesting that the Swan River Pluton and a number of similar monzonitic to gabbroic elongate bodies northwest of the Wathaman Batholith could potentially represent the earliest melts of the Wathaman continental-arc batholith. These intrusions were previously inferred to be Archean and thus assigned to the Peter Lake Domain (Macdonald and Thomas, 1983; however, see Bickford et al., 1986, 1987). In order to group rocks by relative age as determined from field relationships, we will describe below the Swan River Pluton together with the Wathaman Batholith.

## Swan River complex

This map unit, originally named "Swan River Pluton" by Stauffer et al. (1981), was originally limited to a pluton, part of which occurs in the southwestern corner of our map area. Because this intrusion is compositionally heterogeneous and involves small plutons as well as sills and/or dykes, we henceforth modify its name to "Swan River complex". Throughout the area, rocks of the Swan River complex are compositionally heterogeneous and commonly layered (Fig. 5). Layering varies from metre to centimetre scale and is continuous over a few tens of metres. Crosscutting sets of rhythmic layers are commonly observed as well, suggesting emplacement in a tectonically active environment. In contrast to the recrystallized and highly metamorphosed nature of the Lueaza River granitoid rocks, rocks of the Swan River complex contain mostly original igneous minerals and were metamorphosed at uppermost greenschist facies only. The best exposed outcrops occur on a group of islands between Feavivour Peninsula and Crane Island (NTS map area 64 E/16). At that locality, a sill is characterized by a lower ultramafic layer a few metres thick formed of alternating harzburgite and dunite. This grades into massive olivine gabbro with well developed subophitic textures and layered gabbro with centimetre-scale rhythmic layering (Fig. 6). In rare localities we have observed leucogabbro and anorthosite layers as well. Gabbro locally grades upwards into massive to rhythmically layered diorite composed of approximately equal proportions of plagioclase and hornblende  $\pm$  clinopyroxene (Fig. 7). The diorite component is locally subophitic, suggesting that it is in part derived from postcrystallization hydration of gabbro. Geochemical analyses (in progress) may determine whether this rock is truly diorite, or hydrated gabbro. The subophitic diorite and gabbro locally host spectacular pegmatitic pods (Fig. 8). These are presumably similar to the pegmatitic gabbro sampled southwest of Crane Island which yielded a preliminary U-Pb age of  $1865 \pm 10$  Ma (Bickford et al., 1986), later revised at  $1908 \pm 27$  Ma (Bickford et al., 1987).

Another important component of the Swan River complex consists of small plutons and pods of coarse-grained, pitted diorite. Numerous, ovoid, weathered-out pits are produced by concentration of igneous biotite in small spherical zones 1–4 cm in diameter, which tend to be preferentially



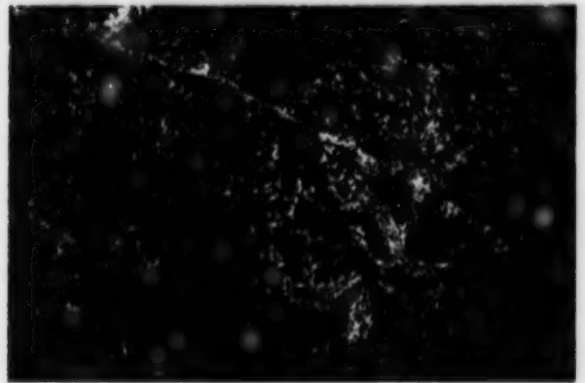
**Figure 5.** Outcrop photograph showing centimetre-sized rhythmic layering in gabbro of the Swan River complex. Bands are outlined by variations in the relative abundance of plagioclase versus mafic minerals; small island west of Feaviour Peninsula; hammer for scale.



**Figure 6.** Layering in coronitic metagabbro, crosscut by a gabbro pegmatite dyke. The dyke is similar in texture and composition to some of the concordant layers; small island west of Feaviour Peninsula.



**Figure 7.** Rhythmic layering in diorite showing the highly contrasting black and white layers of igneous hornblende and plagioclase, respectively; north shore of Patterson Island.



**Figure 8.** Pegmatitic pod in hydrated gabbro showing well developed subophitic textures. Minerals are mainly hornblende after pyroxene and unrecrystallized plagioclase; pen flare holder for scale.



**Figure 9.** Outcrop photograph of a characteristic component of the Swan River complex showing of ultramafic veins (dark colour) and coarse-grained monzodiorite related to the Wathaman Batholith, intruding fine-grained diorite; hammer for scale.



eroded on the outcrop surface. This quite characteristic component of the Swan River complex has been observed in rafts in the Wathaman Batholith and as intrusions in the Peter Lake Domain. Very similar, possibly related intrusions have also been observed in the La Ronge Domain near Laxdal and Doucet islands and in the Cowie pluton, south of the Wathaman Batholith (Corrigan et al., 1999). Another commonly observed component consists of igneous breccia with fine-grained, football-sized gabbro and/or diorite pods injected with either 1) thin ultramafic veins composed mainly of hornblende or orthopyroxene and/or 2) a net veinwork of medium- to coarse-grained diorite to K-feldspar megacrystic monzodiorite. The texture of this rock is quite characteristic (Fig. 9) and is observed on many outcrops within the Peter Lake Domain. The potential link between the predominantly mafic Swan River complex and the Wathaman Batholith significantly increases our understanding of this intrusive suite.

### *Wathaman-type megacrystic granitoid rocks*

Five different compositional types of K-feldspar megacrystic granitoid bodies have been identified in the Wathaman Batholith and their distribution is shown in Figure 2. In order of decreasing abundance their composition consists of granodiorite, granite, monzonite (±quartz), syenite, and monzodiorite. Feldspar megacrysts are pink microcline with igneous zoning and vary in length from 1 cm to 8 cm. Rapakivi textures have been observed in the Ballentin Islands and Cumines Island areas. Primary igneous textures such as accumulated megacrysts (Fig. 10) and magmatic flow alignment demonstrate that the crystals are igneous and not the end product of later metasomatism (e.g. Stauffer et al., 1981; Lewry et al., 1981).

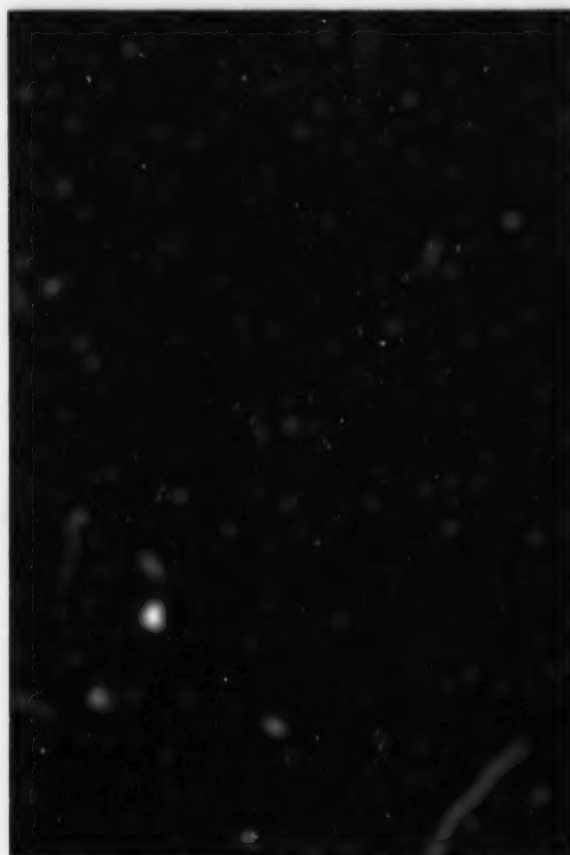
Megacrystic granodiorite underlies most of the central portion of the Wathaman Batholith. The rock is light grey, coarse grained and comprises 15–40% pink K-feldspar megacrysts set in a matrix of plagioclase, quartz, hornblende, and biotite. Hornblende is either equally or more abundant than biotite, both minerals forming up to 25% of the rock volume. Titanite, titanomagnetite, allanite, and epidote are ubiquitous accessory minerals.

Megacrystic granite occurs mainly in a large band separating the granodiorite from the Peter Lake Domain. It is light pink and differs from the megacrystic granodiorite only in the abundance of K-feldspar over plagioclase and the greater abundance of biotite (10–15%) over hornblende (0–10%). In addition, titanite and epidote are either rare or absent from the accessory minerals. The proportion of K-feldspar megacrysts varies much more in the granite than in any other rock type, commonly grading into homogeneous, medium- to coarse-grained granite.

Megacrystic monzonite to quartz-monzonite occurs at three localities in the map area, all in proximity to the Peter Lake Domain boundary. This rock is in all aspects identical to the megacrystic granodiorite, with which it locally appears to grade, except for the relative abundance of quartz,

plagioclase, and potassium feldspar. This unit, as well as the megacrystic granite, are crosscut by the granitic phase of the batholith.

Megacrystic syenite occurs in a well exposed pluton on Patterson Island, where it has alternatively been interpreted as megacrystic diorite (Stauffer et al., 1981; MacDougall, 1988). This oval intrusion is virtually undeformed, with abundant, randomly oriented K-feldspar megacrysts set in a predominantly hornblende (augite)-rich matrix (Fig. 11). Hornblende (locally augite as well) (20–30%) is much more abundant than biotite (1–5%). The only accessory minerals visible in hand specimen consists of titanomagnetite. This pluton had previously been interpreted as forming part of the Swan River complex, and had therefore been informally ascribed an Archean age (Macdonald and Thomas, 1983). However, because of its low state of strain and unnoticeable metamorphic overprint, we believe that it more likely belongs



**Figure 10.** Outcrop photograph showing high concentration of K-feldspar megacrysts in a layer parallel to the magmatic layering in a granitic phase of the Wathaman Batholith. Rest of outcrop contains only about 5% of scattered megacrysts; small island northeast of Ballentin Islands.



**Figure 11.** Close-up photograph of the Patterson Island megacrystic syenite showing the unrecrystallized state of minerals and a few mafic cognate xenoliths. Dark groundmass is predominantly hornblende with minor augite and biotite; pen flare holder for scale is 12 cm.



**Figure 12.** K-feldspar megacrystic monzodiorite injected in Swan River complex diorite. Chilled margin in the diorite component and the rare presence of K-feldspar megacrysts in the diorite suggest possible co-mingling of magmas; hammer for scale.

to the Wathaman suite. This hypothesis is currently being tested at the U-Pb Geochronology Laboratory at the Geological Survey of Canada.

Megacrystic monzodiorite forms the least abundant rock type (too small to show in Fig. 2) of the Wathaman suite. It occurs in close association with the Swan River complex where it typically grades into, and locally intrudes gabbro-diorite in a vein network (Fig. 12). It consists of K-feldspar megacrysts (< 40%) in a medium- to coarse-grained hornblende-plagioclase/ biotite matrix. The relationship between the megacrystic monzodiorite and the Swan River complex forms the most convincing argument that the complex forms an integral part of the Wathaman suite.

### ***Other granitoid rocks related to the Wathaman Batholith***

Both granite and granodiorite occur without K-feldspar megacrysts. These usually grade with megacrystic varieties of the same composition, suggesting that the formation of megacrysts is due to local conditions in the magma chamber(s). Large areas without K-feldspar megacrysts are identified on the map. The only other nonmegacrystic granitoid rock type consists of a large tonalite pluton occurring on Cumines Island (Fig. 2). It is grey, medium grained, equigranular, and contains both hornblende (~5%) and biotite (~5%) as mafic phases. It crosscuts megacrystic granitoid rocks of the Wathaman Batholith and thus appears to form one of the youngest phases.

### **NATURE OF THE WATHAMAN BATHOLITH BOUNDARIES**

In last year's report, we had investigated the nature of the southern boundary of the Wathaman Batholith and had concluded that it was intrusive into the Park Island assemblage of the La Ronge Domain, albeit moderately reworked by south-directed thrusting along the Reilly Lake shear zone (Corrigan et al., 1999). Lafrance and Varga (1996) examined the Parker Lake shear zone in the Reindeer Lake area and concluded that it was the locus of mainly dextral strike-slip motion, with components of sinistral movement as well. They also suggested that the Parker Lake shear zone in the Reindeer Lake area does not bound the Peter Lake Domain with the Wathaman Batholith, but cuts into the latter. This summer, we have investigated the Parker Lake shear zone beyond the area investigated by Lafrance and Varga (1996) and have not been able to trace it much further to the northeast (Fig. 2), suggesting that this splay terminates somewhere within Reindeer Lake. The observation that both the Reilly Lake and Parker Lake shear zones terminate in the vicinity of Reindeer Lake suggests that most of the later transcurrent movement must have been localized on the Needle Falls shear zone north of Peter Lake Domain.

### **ECONOMIC GEOLOGY**

Exploration activity in the map area was concentrated at two localities. Husky Oil drilled and trenched a ground electromagnetic anomaly near a graphitic shear zone on the shore of Reindeer Lake west of Patterson Island (Wiley Bay showing, Saskatchewan Mineral Deposits Index No. 569). Lacana Exploration Inc. (in 1986) investigated the Wiley Bay showing and parts of the Swan River gabbroic suite for platinum group element (PGE) potential, and report assay values of 91–4000 ppb Pd and 84–561 ppb Pt (reported from MacDougall (1988)). More detail for these localities is provided in MacDougall (1988). This summer, we have identified more outcrops of the Swan River complex and have noted a few, rare, sulphide-bearing horizons in the layered mafic and ultramafic components. Some of the better

exposed outcrops are on small islands west of Feavivour Peninsula in NTS map area 64 E/16, at UTM co-ordinates 6412900N, 660250E and 6412450N, 658800E.

## DISCUSSION

The aims of this past summer's mapping were to 1) investigate the compositional and structural framework of the Wathaman Batholith, 2) map the southeastern margin of the Peter Lake Domain with emphasis on its relationship with the Wathaman Batholith, and 3) continue the on-going sampling program for U-Pb dating at the Geological Survey of Canada in order to gain knowledge on the absolute age of protolith formation, metamorphism, and deformation. One of the fundamental questions asked in earlier studies of the Wathaman Batholith was whether or not it was composite, as is the case for most modern analogues (e.g. Meyer et al., 1992). Within the batholith, we have found that most phases, especially the megacrystic granodiorite, quartz-monzonite, and monzonite, appear to grade into one another (albeit within a short distance), as was concluded by earlier workers. However, the key to this question lies not only on how we interpret the batholith *per se*, but whether we include all other 'satellite' intrusions as well, including the Swan River complex and ca. 1.86-1.85 Ga calc-alkaline plutons that are scattered throughout the La Ronge-Rottenstone domains (Corrigan et al., 1999). The field evidence we have presented above, suggesting that K-feldspar megacrystic monzodiorite grades with diorite of the Swan River complex, as well as the observation that a texturally distinct 'pitted' diorite of the Swan River complex also occurs in the La Ronge Domain, strongly suggests that the batholith includes a wide range of intrusive types, from layered mafic-ultramafic sills to granite. This also significantly increases the known geographical extent of the Wathaman Batholith.

Another significant contribution from this summer's work is on the nature of the Peter Lake Domain-Wathaman Batholith boundary. Attempts at mapping out the Parker Lake shear zone beyond about 10 km northeast from the western shore of Reindeer Lake did not reveal its extension. Instead, we have noted a gradual, northeasterly decrease of strain. This is consistent with the observation of Lafrance and Varga (1996) that the Parker Lake shear zone diverges near the western shore of Reindeer Lake and continues solely within the Wathaman Batholith, separating nearly identical rocks on either sides and suggesting minimal displacement. North of this structure, we have found numerous evidence that the Wathaman Batholith (including the Swan River complex) intrudes gneiss of the Peter Lake Domain. This, coupled with documentation in last year's report that the Wathaman Batholith intrudes rocks of the La Ronge-Rottenstone Domain along its southern margin (Corrigan et al., 1998a; 1999) lends support to the long held view that the Wathaman Batholith stitches the La Ronge arc to the Archean Hearne margin (Lewry et al., 1981; Bickford et al., 1990).

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